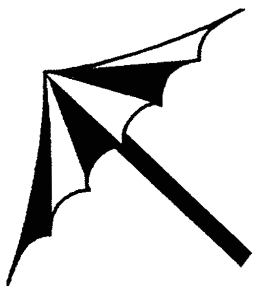
GATEWAY

THE OFFICIAL JOURNAL OF
THE GIPPSLAND GATE RADIO
AND ELECTRONICS CLUB



FEBRUARY 1998

Gippsland Gate Radio and Electronics Club Inc.

Club meetings are held on the third Friday of each month at the Cranbourne Girl Guide Hall in Grant street.

The doors open at 8:15 PM & the meeting commences at 8:30 PM

Visitors are most welcome.

Committee Members 1996/1997

President	Ian Jackson	VK3BUF
Secretary	Ivan Blezard	VK3ARV
Treasurer	Paul Ash	VK3HAS
Committee member	Graham Brennan	VK3KCS
Social Co-ordinator	Reg Goddard	VK3UK
Magazine Editor &	Robin Linn	VK3TFA
Printing & Dispatch	Ph. 9807-3083	

Deadlines for articles is Thursday week prior to the meeting.

Club Station VK3BJA Located at the Guide Hall

Club Repeater VK3RDD Freq. In 52.575, out 53.575 MHz.

Call in Freqs.are HF on 28.325 MHz-USB

VHF on 146.225 MHz, FM and UHF on 438.850 MHz, FM

Current GGREC Inc. Membership Fee Schedule

Full Member $30.00, Pensioner Member $15.00

Junior Member $15.00, Extra Family Member $10.00

Fees due after each April Annual General Meeting.

THE PRESIDENTS REPORT

The JV fax interface project has proceeded another step this week when I uploaded the PCB artwork to the circuit board company. For those of you who have not been across this project yet, I had better give a quick description. The project will allow any two transceivers to be connected to a box via their microphone and speaker sockets. The serial port of a PC is also connected. The idea is that you can pick up a microphone and chat on one radio while sending or receiving a JVfax or slowscan image on the other rig. At the flick of a switch, you can swap over rigs. The project consists of a box with a modem interface and audio monitoring facilities. It also features full D.C isolation between the rigs and the computer. We are getting twenty boards initially and should have ten kits available at the next prac night. In fact, the focus of the Prac Night will be for people wishing to put their kit together. Bring your tools! The final price of the kit is yet to be confirmed but will be around the $35-$40 mark.

This Friday night I will be giving a short talk on the programming language known as Visual Basic. It is a package for developing those nice windows based programs you see from time to time and is quite simple to get started. Using VB version 3, I will show how simple applications are put together. I have made a simple demonstration program to assist in the design of yagi antennas which will work on any Windows 3.1 or 95 system. Bring a blank disk if you want a copy. In a couple of months we shall have a programmer from Telstra to show how advanced applications are put together.

Next month (March) we shall be accepting nominations for the 1998-99 committee positions. As usual, all positions will be declared vacant at the AGM in April and we must select a new committee. I will not be standing for the Presidents position next year, so if you would like a direct say in running your Club, here is your big chance.

This Sunday (Feb 22) is the date scheduled for our visit to the Crown Casino. Rendezvous is out the front of the main entrance of the New Exhibition Buildings in Spencer st. at 2:00 pm. Bring a wheelbarrow to make it easier to take your money home in case you win. (Bring a pre-paid train ticket in case you don't.)

Reg VK3UK has organised a bowling afternoon at his favourite haunt in Mooroolbark The date is on Sunday 29th of March. There should be an advertisement for this in the next mag. Rumour has it that we will be given a short tour of behind the scenes to see how it *really* is that the pins are replaced after being knocked over. What you always suspected but were never really sure about.... That's right, a secret room full of manacled monkeys with blocks of wood, whittling knives wielding a can of fast drying white paint.

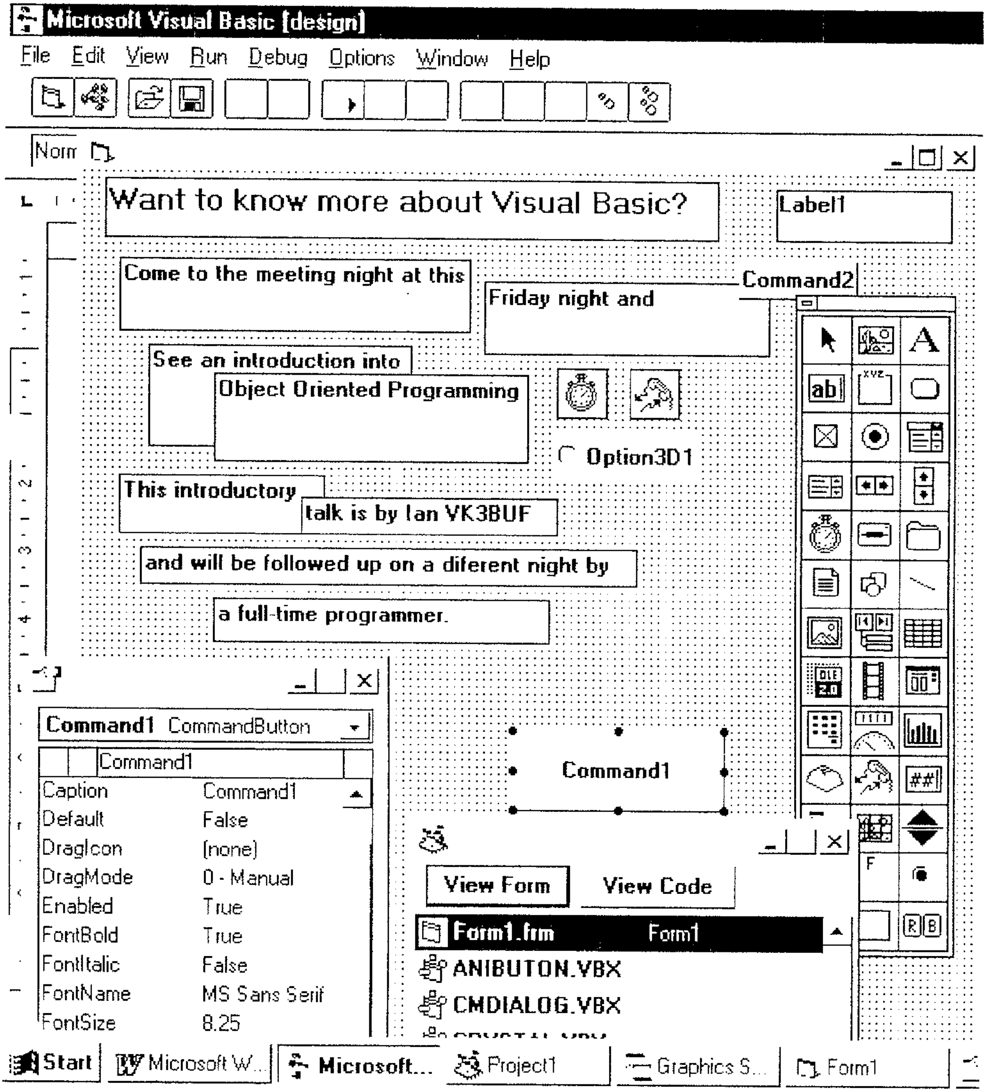
See you this Friday night. **DE, Ian VK3BUF**

WARRNAMBOOL by D. Jackson.

Were going to Warrnambool,
that sounds like a mouth full.
Its going to be a lot of fun,
Sand, Sea, Surf and Sun.
There's plenty of things for the kids to do,
I suppose they will have to come along too.
Stay at the Surfside Caravan Park,
book into a cabin, just for a lark.
With lots of friends, Paul, Melinda and Gavin,
Peter, Pat, Ron, Judy, Dave, Cathie, and Robin,
Jenny, Kate, William, Ross, Hal, and Ian,
all gather around and let the fun begin.

Walk on the beach to see the breakwater,
kids play with Kate, Dave and Cathie's young daughter.
Ride your bike along the path through the tunnel to the park,
Flying Fox, swings, motor boats, just be home before it gets dark.
We visited the volcano at Tower hill,
where we saw koalas sitting in the trees very still.
Carnival music in the air, Dodgem Cars and more,
Ali Baba ride swings round and round and Fairyfloss galore.
Watch a movie with some friends, a comedy video.
Grab a drink and a bite to eat, sit back and enjoy the show.
Dinner at the RSL was delicious and priced just right,
A flutter on the poker machines before heading home that night.
At Port Fairy we saw Mutton Birds by their thousands flying round,
landing very clumsily, at their nests upon the ground.

From the maritime museum to the ship wreck coast,
I cant make up my mind about which part I liked the most.
Its time to leave and end our stay,
and Lock Ard Gorge is on the way.
Drive all day, wheels turning round,
till we arrive home, safe and sound.



QRM or QSY?

Recently Graem VK3XTA had a TVI problem with a neighbour. It seems that if he key down his transmitter on 2 metres, the neighbour's TV would shift from their favour documentary on the ABC, directly to channel 10! (with full sound and colour) Regrettab they are *not* fans of the Simpsons. If you take the Ch 10 centre freq. of 209.25mHz a subtract the Ch 2 centre freq. of 64.25mHz, the difference is exactly 145.000 mHz!

It appears that their masthead amplifier is not very tolerant of stray RF....

The Feedline Argument

One of the perennial arguments on the air is the one of "coax versus parallel line." Perhaps a little history and a few facts about the feeding of antennas might add some fuel and some intelligence to the discussions. Everything said about transmitters except power applies to receivers as well.

First, antennas were erected solely with the idea that the more wire and the higher the wire, the better. No thought was given to feed line because the antenna was grounded and a part of the transmitter circuit anyway; however, with the coming of the "short" waves, it became apparent that the best antenna was a half-wave as high as possible. Of course, the grounded vertical was and still is used, but the half-wire horizontal antenna had to have a feedline. Height had some influence, but was not deemed important.

Right away, it seemed, an argument began:

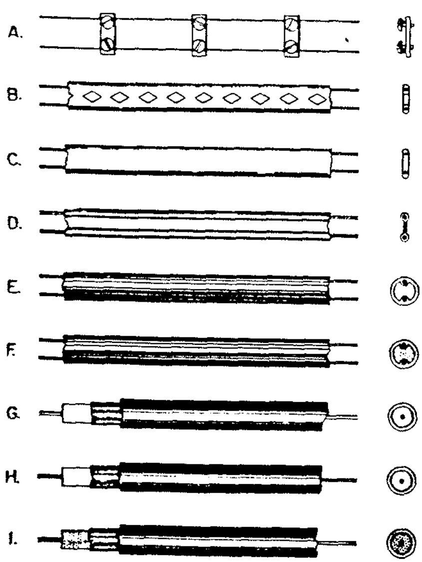


Fig. 1. Common types of feedline.

Which was better—end feed or center fe Also, what was the proper "impedance" of line? The impedance didn't really matter amateurs, but the feed point did. If you at the end, you needed only two supports the wire, one at either end; but if you in the middle, *three* supports were usu needed, one in the middle to hold up feedline. The feedline was the same for bo

It was the so-called "ladder line" (Fig. of two wires held apart by spacers. The i pedance was often given as "600 ohms," nobody cared very much. "Standing waves, thought of at all, were expected and even couraged. Everyone had an antenna tuner w variable coupling to the transmitter.

The "center feed" side had the best of argument, it seemed. No matter what f quency was put out, the feedline was alw "balanced"; the voltage and current in wire always canceled out the voltage and c rent in the other wire. Result—no feedli radiation. This was not true of end-feed wh feedline radiation occurred whenever the tenna itself was not exactly a half-wave multiple of a half-wave long. You rarely h of an end-fed half-wave these days.

Just before WW-2, somebody discove that a half-wave horizontal wire (dipole) co be fed with ordinary twisted lamp cord. was lousy when wet, but was easier th building a feedline. It wouldn't handle a ki watt either. The manufacturers brought o EO-1 cable, which wasn't very good, but w much better than the lamp cord it replace it was the first generally available low-co low-impedance feedline.

Then came the War and polyethylene. and the war-surplus made low-cost feedlin available to everybody, and the argumen started, growing with each new developme in feedlines. Today we have lots of lines ava able, thanks to polyethylene and to TV. S Fig 1. We have.

a. Ladder-line, two wires held separated spacers.
b. "Punched" line, a ribbon type with

portion of the polyethylene removed.
c. Ribbon line, of solid polyethylene.
d. "Dumbbell" line, with the insulation thinned to make it cheaper.
e. Tubular line, to reduce the effect of rain.
f. "Foamed" line, lower losses than the tubular.
g. Solid inner conductor coax.
h. Stranded inner conductor coax.
i. "Foamed" coax with less insulation than standard.

The ribbon types we owe to TV and is nearly always 300 ohms. The coax is either about 75 ohm or 50 ohm impedance.

All insulation has dielectric losses, and while polyethylene is good, some kinds have losses that are higher. With air as 1, solid polyethylene (as in the coax type) has a figure of about 2.6 and the nitrogen foamed variety about 1.7. In contrast, the ladder type line has a figure of 1.01 or better. Air is the ideal.

The losses in db per 100 feet increase with the frequency and the amount of insulation. For the lower bands, as 75 meters, it will make very little difference *what* kind of line is used, but on 2 meters it will pay to study the loss figures very carefully. It is very easy to lose three-fourths of your power in the feedline on two meters!

Power-handling capability varies greatly with the type of line in use. It has nothing to do with db loss, but increases with the size of the conductors and the impedance of the line. Always remember that a given line will handle less and less power as the SWR goes up because it is the SWR that determines the maximum current on your line, and the line will handle no more current than the smallest of the conductors can handle without melting or distorting the insulation. A line may be "good" for 500 watts only with a 1:1 SWR.

The SWR on a line increases losses in db, but it is only of importance if the db loss of the line is already high or if it exceeds the wattage rating of the line; otherwise, the SWR on the feedline is of little, if any, importance. If the antenna takes the power, it will radiate it no matter *what* the SWR is.

Nor is the impedance of a line of very great importance except it should match the antenna. These days it is possible in some way to match an antenna to almost any line available. Of course, nearly all manufactured and kit-form transmitters are built to "match" 50 ohm coax. This is the cause of the argument.

A "balanced" antenna—dipole, yagi, quad, rhombic, etc.—requires a balanced line, as ladder line or ribbon. An unbalanced antenna —grounded vertical, groundplane, coaxial skirt

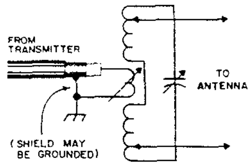


Fig. 2. Antenna matcher.

—requires a coax line. Transmitters nearly all require coax.

What is the best type of line? The "ladder" type. With proper type separators, it has negligible loss, is practically unaffected by the weather, standing waves do not bother it, and, being air-cooled, can handle much higher power for a given wire gauge. There are a few drawbacks. The impedance is high, usually 300 ohms or more, and commercial varieties often have plastic separators that become very brittle when exposed to light of the sun. With all types of balanced line, it is necessary to keep the wires of equal length and spacing, several inches at least, away from all conducting objects, and make all turns gradual.

Next to the ladder type line in desirability is the round nitrogen foamed line, then the round tubular line. Both are relatively unaffected by wet weather, with the foam type giving the lowest loss. As with all polyethylene insulated lines, the power and/or standing waves must be kept down to keep from melting the insulation. The flat, or ribbon, lines are the worst (and cheapest) types, very much affected by rain. If you must use polyethylene, be very sure you get the type with an ultraviolet inhibitor that prevents the development of brittleness when exposed to sunlight.

For coax line, be sure it has virgin polyethylene insulation, white or clear, not brown. It needs no additives against ultraviolet or sunshine, being covered. Stranded wire is best for the center conductor in the interest of flexibility. The shield braid should be tight, covering 95% of the polyethylene. The neoprene coating should be of the best, with no plasticizers that will "bleed" into the center insulation in hot weather. Lastly, the nitrogen foamed line is much the best. If you can, inspect a sample. If the different layers stick together, it is old and of poor quality. The impedance, of couse, should be of the proper value.

The big question is, of couse, "How do you connect a balanced dipole to an unbalanced transmitter?" The answer is, "You must use some sort of matching device." The common-

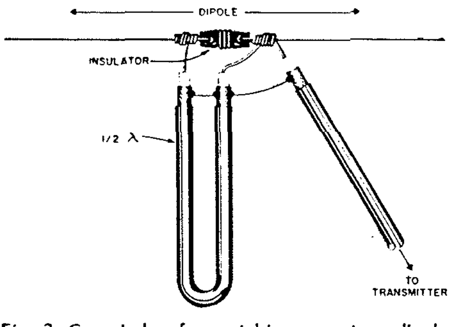


Fig. 3. Coax balun for matching coax to a dipole.

est is either an antenna tuner or a balun. **Fig. 2** shows the circuit of a typical antenna tuner. If you do *not* use a matching circuit, regardless of the impedance, the shield of your coax will pick up a voltage equal to the center. The center cannot radiate, but the shield can and does. This is the reason coax cannot be recommended for balanced type antennas. The radiation can, and sometimes does, "back-up" on the transmitter chassis and the AC line to cause feedback and TVI.

Parallel wire line will radiate whenever the voltage and current in one wire is not exactly equal and opposite to the voltage and current in the other wire. This can come about through unbalanced feed from the antenna ("Windom" antenna, etc.) where the feedline wires are not the same length, or when one wire runs closer to a conductor than the other. When one wire is grounded at the transmitter (a common case), the balanced feed will put rf on the chassis unless the transmitter ground is a true rf ground, which is almost impossible. The result is a likelihood of feedback at the microphone and/or radiation (and TVI) from the power line. Of course, troubles from radiation increase with frequency.

TV producers long ago found out about coax. For years now all TV beams have been of the balanced line type (300), with a wideband balum transformer to line-type feed to the unbalanced input of the receiver. (Incidentally, these balums will handle low power very well for 2 and 6 meters.)

The antenna turner has the advantage of responding only to one frequency, effectively reducing harmonics. It is unaffected by SWR and feedline impedance, and it will reduce the SWR on the coax to 1:1. (If it does not, the excessive SWR is the harmonic content of the transmitter.) It has its drawbacks, though. It adds two or more controls to the transmitter. It is essentially, even with plug-in coils, a one-band device. (But so is a good antenna.) It really cannot do anything about antenna mismatch and SWR on the feedline.

Coax, such as RG 8/U, can be run anywhere that the insulation will stand, such as inside walls, through pipe, under ground, etc. It will match nearly every transmitter. It is what nearly all SWR meters are built for. With a proper balun it will couple to most antennas. And it will handle a fair amount of power. But it has a pretty high loss at high frequencies and if not balanced, will radiate from the shield.

A ½ wave feedline balun (see **Fig. 3**) is a good device, but only good close to one frequency. It has a 4 to 1 ratio, matching a 300 ohm antenna to an unbalanced 50 ohm feedline. The popular "Gamma" match i good for matching an unbalanced line to a dipole only when the antenna's "neutral point" is thoroughly grounded for rf; otherwise, the shield of the feedline will radiate. Other types of match, such as delta, tee, stub, etc. will radiate from the shild, particularly on harmonics.

On the lower bands, losses in feedlines do not matter so much, but harmonic radiation does. An antenna tuner is the answer. On the high frequencies, a ladder line and tuner can give you three db or more signal. It seems a cheap way of doubling your power.

If you bought your antenna ready made and it calls for coax feedline, obey your instructions. Maybe it was built to use that line and that impedance. If you feel adventuresome or like to build your own, consider the ladder-type line and an antenna tuner. It will practically eliminate harmonics, laugh at any SWR, and reduce losses. Just be sure the wires are of identical length, have no sharp bends, and are evenly and closely spaced. The nitrogen foamed parallel line is almost as good, but has more loss and will not handle the power.

Coax line should be used with some sort c a balun. The ½ wave balun of **Fig. 3** discriminates somewhat again harmonics as well as balancing the feedline output. There is little to be gained by cutting a coax to a certain length for better feed. If it works, the SWR is too high anyway. Coax is a good type of feedline within its limits—short lengths, or low frequencies, with some balancing system to keep the shield "cold", and low SWR—and it matches nearly all transmitters.

I hope the statements in this article will, perhaps, put a few more watts on the air and reduce a few SWR's *and* add fuel to the FEEDLINE ARGUMENT. . . . WØOPA

TRANSISTORS ARE NOT READY YET

LIMITED use of semiconductor elements and devices is as old as radio, of course, but until recently there had been little technical progress in this art. Within the past few years interest in semiconductors, including transistors, has become very great.

The first transistor was announced only four years ago. During this short period the acceleration of engineering effort has been unusual. Important progress has been made in learning the fundamental theory of operation of transistor devices and in establishing control of their operating characteristics and construction processes.

Experimental results already obtained in the laboratories indicate the practicability and usefulness of transistors. There appear to be a number of fields in which transistors will be used widely and to great advantage.

The development of the transistor will make possible new types of electronic equipment which will use not only transistors, but also electron tubes and other electronic components in increasing quantities. The commercial application of transistors appears to be not too distant, although a considerable time is probably required before these units become commercially available on any sizeable scale at low cost.

SMALL SIZE

The intense interest in the transistor may be attributed to the fact that it performs functions similar to those of electron tubes. The transistor is of particular interest to equipment designers who see many circuit possibilities in its characteristics. It is small in size and the power requirements for its operation are extremely low.

When suitable circuits are developed, space and power requirements for complex electronic equipment may be simplified to a large degree by the use of transistors. Another promising feature is that the operating life of certain types of transistors shows indications of being very long, thus minimising replacement problems.

The physical ruggedness of the transistor offers other obvious advantages. In addition, the transistor requires no "warm up" time, but will operate instantaneously upon application of voltage to its electrodes.

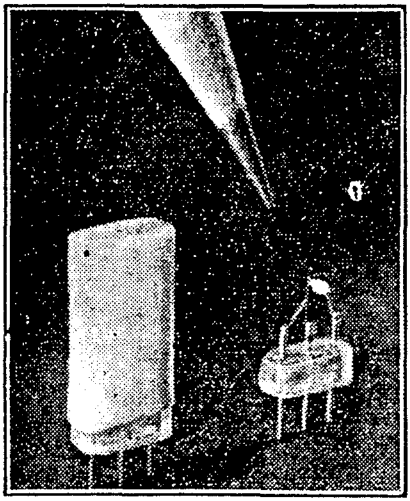
It is anticipated that transistors will be improved in many other respects.

At present, transistors will operate at frequencies up to a few hundred megacycles, but the noise at low frequencies is greater than that of electron tubes. Besides, the power output is relatively low.

Nevertheless, when the favorable characteristics of the transistor are weighed against its limitations, it appears that this device, even in its present developmental stage, is destined for many applications. The anticipated improvements in characteristics undoubtedly will create new and expanding fields of use.

At the same time, the principles of semiconduction in solids may be expected to play an increasing part in the development of many new electronic devices of which the present transistor is but the first.

There are two types of transistors of major interest at this time—the point-contact type and the junction



Development junction-type transistor before and after embedment in plastic container, shown here in comparison with pencil point.

type. The point-contact transistor was developed first and has performed at higher frequencies. In many applications, however, the junction transistor promises to be as important as the point-contact type. In comparison with point-contact transistors, the junction types have lower noise, higher power gain, greater efficiency, and higher power-handling capabilities, but at present are more limited in frequency response.

At first, the frequency response of the point-contact transistor appeared to be limited to frequencies in the neighborhood of 4 or 5 megacycles. Recently such transistors have been made to oscillate as high as 300 megacycles. Currently, the simple junction transistor has been made to amplify up to several megacycles and the limits are being rapidly raised.

HEAT PROBLEM

The power capabilities of either the point-contact or the junction transistors depend largely on the rate at which heat can be removed from the active portion. There are no basic limitations imposed by the electronic principles of transistor devices which will prevent the attainment of high powers. With relatively simple special cooling means, particularly with the junction types, it is possible to design units with outputs up to one watt or more.

The life expectancy of transistors is largely dependent on electrical and physical considerations. Realisations of tens of thousands of hours does not seem unlikely in normal operation. Transistors can be physically rugged. They can be made practically impervious to moisture and the elements.

Resin-embedded units have withstood impact acceleration of 1900 times gravity and centrifugal acceleration of 31,000 times gravity.

Transistors have been immersed in water for several months, with practically no effect.

Although high ambient temperature is now a limitation, developments indicate progress in lowering this barrier. No damage occurs to the transistor during storage from minus 94 degrees F to 212 degrees F. Operation over the wide ambient range of minus 94 degrees F to 122 degrees F is practical and higher ambient temperatures will be feasible if proper attention is given to heat dissipaton.

Uniformity of characteristics comparable to that of the electron tube seems possible. The art of crystal growing is rapidly progressing and the uniformity of germanium has progressed to the point where various transistor characteristics such as current amplification, power gain, feedback resistance, and input and output resistance have been controlled within plus or minus 25 pc.

At present, the characteristics of high gain, low noise, greater stability, higher efficiency and higher power capabilities indicate that the junction transistors will be used principally as oscillators and amplifiers at lower frequencies. Another feature of the junction transistor is its ability to oscillate with power inputs around one-millionth of a watt.

On the other hand, the point-contact transistor may be applied to very-high-frequency circuits wherever noise is not a limiting factor. Another feature of the point-contact transistor is the negative resistance properties which are especially useful in counter and similar circuits.

Estimates of the time when transistors will be available in quantity for production of saleable products must be somewhat speculative.

Engineering of some types of transistors has reached an advanced stage. The problem of providing adequate supplies of processed germanium with proper characteristics at reasonable costs remains to be worked out.

Limited application in special devices where cost and quantity are not major factors is close at hand.

Extract from Radio & Hobbies, circa March 1953

EVENT QUEUE from February 1998

FRIDAY	20/2/98	8:15	VISUAL BASIC LECTURE
SUNDAY	22/2/98	2:00 pm	Crown Casino visit
FRIDAY	6/3/98	8:15	Prac Night, JV Fax kit construction
FRIDAY	13/3/98	8:00	Committee meeting
FRIDAY	20/3/98	8:15	General Meeting (Nomination forms due this night)
SUNDAY	29/3/98		Bowling and dinner at Mooroolbark
FRIDAY	3/4/98	8:15	Prac Night
FRIDAY	17/4/98	8:15	Annual General meeting

Gippsland Gate Radio and Electronics Club Inc.
Committee Position Nomination form 1998

Position	*Name*	*Moved*	*Seconded*
President			
Secretary			
Treasurer			
Member #1			
Member #2			

To be accepted the completed form must be returned to the Secretary by Friday the 20th of March

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